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CONTENTS

Calvert—Samuel Francis Aaron 137
Richards and Korda—Electron micrographs of setae 141
Banks—(A letter to the News) 145
Chamberlin—Chilopods from Panama 146
Robinson—Notes on Scarabaeidae 149
Frota-Pessoa—Drosophila mallochi 151
Notes and News in Entomology
Schmieder—More about dancing bees 152
Steyskal—Insect collection records by States 154
Soukup—Appeal for information on Peru 156
List of titles of publications 157
Current Entomological Literature 159

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Samuel Francis Aaron

SAMUEL FRANCIS AARON, widely known as S. FRANK AARON, died near Pipersville, Bucks County, Pennsylvania, on January 15, 1947, as announced in the NEWS for February, 1947. He was born at Mount Holly, New Jersey, March 5, 1862, where his father, Charles Eugene Aaron, was principal and owner of the Mount Holly Institute, a school for boys. His mother was Anna Murray Aaron. An older brother was Eugene Murray Aaron (1854–1940), first editor of the NEWS, as mentioned in our issue for May, 1942, page 142. Later the family moved to Maryville, Tennessee, where Samuel Francis spent most of his boyhood.

On December 25, 1882, he was appointed to one of the Jessup Fund Scholarships at the Academy of Natural Sciences of Philadelphia, established by the children of Augustus E. Jessup, a position held by many young men and young women who subsequently made names for themselves in American biology, as George Howard Parker, Spencer Trotter, William M. Gabb, Charles Conrad Abbott, John A. Ryder and Angelo Heilprin.[1] He was reappointed to this scholarship July 27, 1885.

While a Jessup Fund scholar his first technical entomological paper was published: Descriptions of new Psocidae in the collection of the American Entomological Society (Transactions of the Society XI: 37–40, Dec., 1883). In it are described one new genus (*Dorypteryx*), eight new species and one new variety, mostly collected by himself, in or near Philadelphia, in the summer of that year. Three years later, another paper on the same group appeared: On some new Psocidae (Proceedings of

[1] A Short History of the Academy of Natural Sciences of Philadelphia by Edward J. Nolan. Founders' Week Memorial Volume. Published by the City of Philadelphia 1909, pp. 153–186. Separately paged 1–38.

the Academy 1886: 13–18, 1 plate). "The several new species described here are in the collections of the American Entomological Society" and comprised seven new species, one new variety and one new genus *Echmepteryx;* some of these are from his own collections in southern Texas, others from near Philadelphia. Aaron's types of sixteen species of Psocida are preserved in the Academy of Natural Sciences of Philadelphia.

In 1884 he made a trip to Texas with Corpus Christi as his headquarters. He collected insects for the most part within a radius of fifty miles to the north and west of that town, from mid-March to June. In the latter half of June he went along the coast to the Colorado River, over one hundred miles distant. All his excursions were made under the guidance of Mr. John Priour, of Corpus Christi, a collector in other branches of natural history. The story is told in Aaron's article, "Collecting on the Gulf Coast of Southern Texas," published in Papilio, a journal devoted to the Lepidoptera, of which his brother, E. M. Aaron, was editor, Volume IV: 159–161, for November, 1884. It mentions only the Lepidoptera which were observed or gathered. Another result of this expedition, nearly twenty years later, was the description of a dragonfly, *Neoneura aaroni,* by the present writer (Biol. Centr.-Amer. Neur. 139, 1903), while in 1890 *Lepthemis* (now *Brachymesia*) *gravida* Calvert had been described in part from material from the same source (Trans. Amer. Ent. Soc., 17: 35).

On March 27, 1885, he was chosen by the Committee in charge for the Entomological Section of the Academy to be custodian of insects for the balance of the year. In this period his most extensive entomological paper appeared: The North American Chrysididae (Trans. Amer. Ent. Soc. 12: 209–248, 5 pls., 1885). Its author writes: "The materials upon which this monograph is based are the almost perfect collections of the American Entomological Society, containing the types of Messrs. Cresson and Norton, together with a large number of undescribed forms, and the collection of M. Provancher, of Canada, kindly loaned me for study, containing all his type specimens described in the 'Naturaliste Canadien' with other rare and interesting species." It describes one new genus, *Diplorrhos,* and

thirty-one new species. Alexander Mocsary, of the National Hungarian Museum at Budapest, expressed a favorable opinion of it in his Monographia Chrysididarum orbis terrarum universi [2] and replaces the preoccupied name *Chrysis hirsuta* Aaron with *C. aaroni* (p. 386). Aaron's types of thirty-two species of Chrysididae are listed by Cresson as being in the Academy of Natural Sciences of Philadelphia (Mem. Amer. Ent. Soc. 5: 28–30, 1928).

The writer possesses some manuscript "Notes and drawings of Odonata and Neuroptera S. Frank Aaron," undated, but probably of about this period, given to me many years ago by their author. They contain many notes in the characteristic handwriting of Dr. H. A. Hagen, indicating that Mr. Aaron was in correspondence with the great entomologist of the Museum of Comparative Zoology.

In 1896 he became economic entomologist at the Philadelphia Commercial Museum and held this position until at least 1906, according to data which doubtless he furnished to the first edition of American Men of Science of the latter year.

In 1907 he married Elsie W. Lindsey, who survives him. Mrs. Aaron has kindly supplied a number of facts concerning her husband and has presented to the Academy of Natural Sciences of Philadelphia a scrap book which he had made and entitled "The nearly complete periodical writings of S. F. Aaron from 1881 to Herein collected in 1914." It comprises 232 pages, 14 × 10 inches, with an index as far as page 154. The contents are printed clippings arranged in chronological order. Actually the collection extends to November, 1938, but does not include his papers already mentioned. They deal with many phases of popular natural history, the earliest being on "Odd bird songs" from the "Philadelphia Record about 1881" copied from the Boston Ornithologist. The earliest article on insects

[2] Budapestini 1889, 4to. pp. xv, 643, 2 pls. After referring to North American species described by previous authors "quas anno 1885 Aaron, maxima ex parte secundum specimina typica revisioni severae subiecit. Opus hoc, summa fide elaboratum ad determinationem specierum hujus orbis terrarum partis maxime difficilem optimum est. Tantum optandum fuisset, ut auctor species Cressoni de insula Cuba quoque non satis complete descriptas in suum opus assumsisset." P. 23.

in this collection, on "The bold robber fly" [*Asilus*], from the Philadelphia Times of 1889, with three illustrations, was reprinted in part in the NEWS for April, 1894, but without the figures. An article on "Migrating Insects," in the Times for 1891, records his observations on vast numbers of the butterfly, *Krigonia lyside*, "a certain large dragonfly" and a "common gray beetle known as the Spanish Fly," perhaps made during his Texas trips above mentioned.[3]

Other clippings on insects are from the Youths' Companion, Popular Science News, Scientific American, St. Nicholas, American Homes and Gardens, New England Magazine, Guide to Nature, Collier's, American Suburbs, Country Gentleman, Philadelphia Public Ledger, Farm Journal, Dearborn Independent and Nature Magazine, many of them with illustrations by the author.

On January 13, 1913, he began a series of daily articles in the Philadelphia Evening Bulletin, "Outdoor Life in Winter, in Spring, in Summer, in Autumn," which continued until July 19, 1915, and occupy pages 80–209 of the scrap book.

An article from the Philadelphia Record of September 15, 1918, describes an attempt in which he took part to eradicate mosquitoes in the Hog Island region of Delaware County, Pennsylvania, and to which is added a note in his handwriting that "The work was a failure throughout."

In 1920–1925 he lived out in the country about nine miles from Lincoln University, Post Office, Pennsylvania.

Mrs. Aaron writes of her husband: "He was a life-long student of nature, he knew trees and the wood from them and the wild flowers. He had a way of imparting his knowledge to old and young alike that made him an interesting companion on a hike, or just at home with me. He knew the birds intimately, as well as the four-footed little creatures in the wild. He would often sit down and sketch any of them he might come upon, dead, for future reference."

PHILIP P. CALVERT.

[3] There is, however, a series of three articles in the scrap book from "Our Boys and Girls," apparently a department of the Times, 1891, describing "a hunting trip that I took on the plains of Southwestern Texas when I was a boy of sixteen"; this trip would have been in 1878.

Electron Micrographs of Centipede Setae and Microtrichia [1]

By A. Glenn Richards and Frances H. Korda,
Division of Entomology and Economic Zoology,
University of Minnesota

In connection with a survey of various cuticles and sense organs to locate types most favorable to electron-microscope studies of cuticle structure, Mr. R. E. Snodgrass and Dr. R. V. Chamberlin suggested that we examine the setae on centipede maxillae and antennae. All of the work was done with the common house centipede, *Scutigera forceps* (Rafinesque).

On the midventral line between the bases of the first maxillae of the house centipede [2] there is a rather large pouch which is usually drawn in but which can be extruded. This pouch contains some hundreds of setae of two types: 1. Very long simple setae, 1–2 microns in diameter, which appear homogeneous in the electron microscope; these need not be discussed as we have learned nothing about them other than their apparent simplicity; 2. Flat, ovoid setae with helical thickenings and a short, fine-pointed tip (figs. 1 and 2).

The top and side views of these remarkable setae seem self-explanatory. From a small socket the setae swell out with a relatively heavy wall (cuticle); then the wall ceases to be uniform, for alternating thick and thin areas set at an angle of 35–40° to the cross-sectional plane give an appearance remarkably similar to that of a tracheal wall with its helical taenidia. These thickenings are 0.1 to 0.3 microns broad and separated for about the same distance by an extremely thin membrane (only about 0.01 μ thick when dry). Overall dimensions are: total length 80–90 μ, diameter of base 1–2 μ, diameter at broadest point on flatter surface 10–11 μ, diameter in shorter direc-

[1] Paper No. 2346, Scientific Journal Series, Minnesota Agricultural Experiment Station, St. Paul 1, Minn. The observations recorded in this paper were made in connection with work on a contract for studies on arthropod cuticle between the Medical Division of the Army Chemical Corps and the University of Minnesota.

[2] Dr. Chamberlin writes that these pouches of setae are found only in the family Scutigeridae of the Chilopoda.

tion 2–3 μ; the arc of curvature in "side view" is that of a circle with a radius of 75–80 μ.

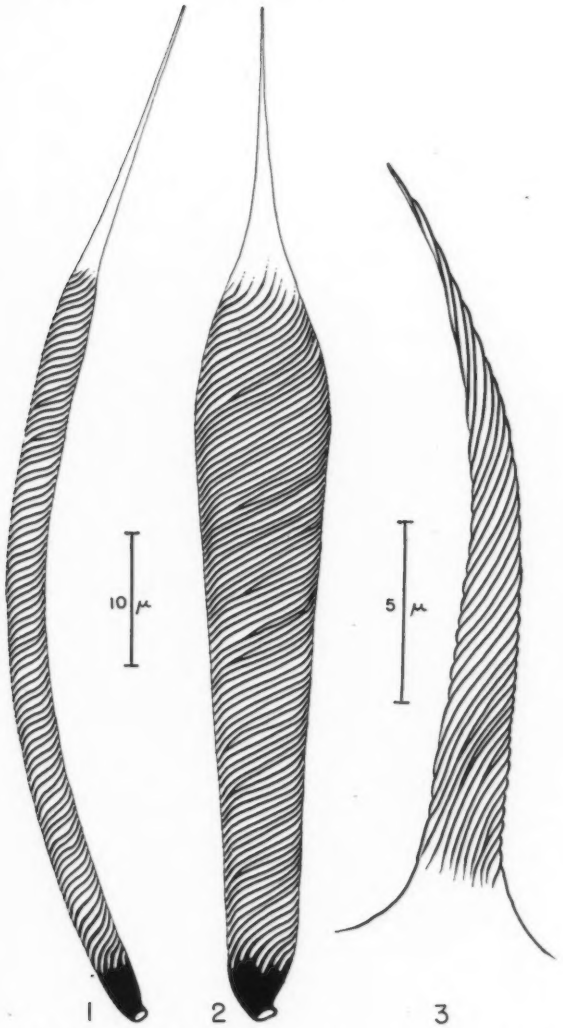
At the base of each seta some 12–14 of these helically pitched thickenings start; by branching, the number is increased to about twice this at the broadest point. Rather abruptly the seta contracts in diameter, the helical thickenings taper off into the membrane and are lost, and the tip of the seta tapers out to end with a rounded but none-the-less extremely fine point of only about 0.1 μ diameter. Each helix which extends the maximum length would make 5–6 turns around the seta. It might be repeated that at the base the helical thickenings start in thick, sclerotized cuticle by the development of lines of thin membrane, whereas at the tip the thickenings thin out into the thin membrane.

The structure is made more transparent and diffuse by converting into chitosan (concentrated KOH at 160° C. for 15 minutes) but is not destroyed. The iodine test for chitosan is positive, therefore the setae contain chitin.

When examined with the ordinary-light microscope, the contrast between specimen and mounting medium is usually so low that none of this structure can be discerned. However, if a cleaned seta is allowed to dry in air and is then examined with the high powers of a compound microscope and reflected light a typical diffraction grating pattern can be seen.

Serial sections examined with a light microscope show that these setae arise from sockets in a thin, highly convoluted cuticle that overlies a very thick epidermal layer of cells. No clue as to the possible function of these peculiar setae was obtained.

On the antennae are rows of true setae, of ordinary structure. In addition there are even more numerous rows of somewhat smaller microtrichia, i.e., small hair-like projections of the cuticle which have no special sockets at their base. These microtrichia (fig. 3) are 15–35 μ long and taper from 1–4 μ broad at the base to slightly less than 0.1 μ at the tip. These too show helical thickenings which, however, are not as distinct (the membrane between the thickenings is not so extremely thin and the thickenings themselves are not as heavy), extend all the way



Figs. 1 and 2. Top and side views of setae from maxillary pouch of *Scutigera forceps* (Raf.). Fig. 3. Microtrichium from antenna of same.

to the tip, are thinner (0.05–0.10 μ), more closely spaced (0.07–0.15 μ), and have a much greater pitch (70–80° to the cross sectional plane). We were not able to determine for certain what happens to these helical thickenings at the base of the microtrichium—presumably they are lost as the microtrichial wall curves out into the general cuticle of the antennal segment.

The origin of microtrichia in arthropods is by no means clear. They are customarily viewed as simply hair-like projections of the outer surface of the cuticle—and in whole mounts or sections viewed with a light microscope they appear to be just that. It would seem that these microtrichia from centipede antennae must be more complex. They are not destroyed by treatment in concentrated KOH at 160° C. for 20 minutes, and after this treatment give the typical chitosan color test. They are resistant to mild warming with concentrated nitric acid. Serial sections examined with a light microscope show that they must consist of a layer of endocuticle, a layer of exocuticle and a layer of epicuticle. Electron micrographs of microtrichia simply rinsed in distilled water indicate that they are nearly opaque to electrons except at the edges and tip, but microtrichia given only a mild treatment in alkali (5% NaOH at 25° C. for 5 days) are quite transparent to electrons and are clearly hollow; broken ones show a typical wall and central cavity. This should not be the case if we were dealing with a solid chitin-protein rod but would be expected if the structure contained a protoplasmic core. In an attempt to demonstrate such a core with the light microscope, serial sections (cross and tangential) were heavily overstained with Mallory's triple stain and examined. The tangential sections through the endocuticle showed spots and sometimes holes at points where protoplasmic filaments might be expected to be or have gone out to the microtrichia. The cross sections showed less contrast, but faint lines crossing the cuticle could be detected in those cases where the canal or filament appeared to have been sectioned. Whether or not living filaments extend through the cuticle into the microtrichia in the fully formed antennae is unknown; the data presented above suggest that such a minute filament does occur at some stage since a

duct can be demonstrated and since the interior of the microtrichia can be readily dissolved away.

Incidentally, these figures reemphasize the fact that helical thickenings are no special property peculiar to the cuticle of tracheae. Helical structures, less clearly seen, have already been described for sensilla basiconica of some caterpillar antennae by Dethier [3] and for the anal setae of mosquito larvae by Anderson and Richards.[4] And, as is well-known, helical structures are indeed of wide occurrence, e.g., the pore canals of insect cuticle, in plant cell walls, in wool, in the flagella of protozoa, and even for one type of crack pattern developing in glass tubing. There are several conceivable ways for rationalizing the development of such helices but until some fairly direct evidence is available for cuticular helices there seems little profit in doing more than record these two new types as natural curiosities to be added to the array of simple and bizarre forms already known.

A Letter to the News

The retirement of Ezra T. Cresson, Jr., moves me to express as forcibly as possible his great value not only to the Philadelphia Academy but to the numerous entomologists who depended upon him for information of types. He labored steadily in the most important, though often overlooked, work of preparation, arrangement and preservation of the collection.

Such men are the foundation stones of a museum.

Nathan Banks.

[3] Bull. Mus. Comp. Zool., 87: 455–507. 1941.
[4] Sci. Monthly, 55: 187–192. 1942.

A Few Chilopods taken in Panama by N. L. H. Krauss

By Ralph V. Chamberlin

A small but interesting lot of chilopods collected in Panama Canal Zone in 1946 by N. L. H. Krauss consists of representatives of the five species here listed. The types of the two new species are in the author's collection.

Scolopendra viridis Say

One young specimen taken at Summit in July, 1946.

Cryptops annectus, new species

Cephalic plate overlapping the first tergite; with two short, parallel sulci running forward from the caudal margin.

First tergite with a transverse cervical sulcus well impressed, the sulcus angled at the middle in a pit or depression; with two longitudinal sulci which divide anteriorly, producing a W-shaped mark behind the cervical sulcus. Other tergites to the 20th with the usual paired longitudinal sulci.

Anterior margin of prosternum in form of two low convex bows meeting at a very obtuse angle at the middle.

Sternites with the usual median longitudinal sulcus crossed at middle by a transverse sulcus; with spiracles or other special developments.

Last ventral plate narrowly trapeziform; coxal pores moderate in number, 12–15 on each side, not extending to caudal end of joint.

In the anal legs both the prefemur and the femur are densely spinous beneath with a naked median longitudinal area on each. The prefemur bears a single stouter spine above at the mesocaudal corner. The femur bears a single tooth on the mesoventral line about one fourth the distance from caudal end to base. Tibia with a series of four teeth beneath and the first joint of the tarsus with two. These articles with no teeth above.

Length, 12 mm.

Locality.—Panama: El Valle. August, 1946. One specimen taken under bark of a dead tree. A small, apparently young, specimen taken at Summit is probably this species. N. L. H. Krauss, collector.

Distinct from other central American species having a cervical sulcus on the first tergite in the character of the anal legs as above described.

Genus **CYMOCHILUS**, new

A schendyloid genus resembling *Litoschendyla* in lacking true, rooted teeth on the labrum, the margin of the latter presenting crenatures at the middle, these becoming more acute or tooth-like at the sides. Distinct from *Litoschendyla* in having well developed claws on the anal legs. Claws of second maxillae pectinate. Ventral pores present in a median area. Last ventral plate wide. Coxal pores two on each side.

Generotype.—*Cymochilus panamicola,* new species

The genus may be placed with reference to the other known American genera of the family, excepting the inadequately described *Holitys,* by means of the following key.

Key to American Genera of the Schendylidae

1 (4). Anal coxae each with several pores.....2
2 (3). Anal legs with a well developed claw; claw of second maxillae pectinate.....*Escaryus* Cook
3 (2). Anal legs without claws; claw of second maxillae smooth.....*Sogolabis* Chamberlin
4 (1). Anal coxae with 0, 1 or 2 pores.....5
5 (6). Anal coxae without pores.....*Nesonyx* Chamberlin
6 (5). Anal coxae with 1 or 2 pores.....7
7 (12). Anal coxae with but 1 pore.....8
8 (9). Claws of prehensors when closed much surpassing anterior margin of head.....*Mexiconyx* Chamberlin
9 (8). Claws of prehensors when closed not surpassing anterior margin of head.....10
10 (11). Ventral pores present.....*Simoporus* Chamberlin
11 (10). Ventral pores absent.....*Morunguis* Chamberlin

12 (7). Anal coxae each with 2 pores.....13
13 (18). Ventral pores absent.....14
14 (17). Anal legs six-jointed beyond coxae, with claws....15
15 (16). Claw of second maxillae smooth; prosternum of prehensors with chitinous lines...*Sogodes* Chamberlin
16 (15). Claw of second maxillae pectinate; prosternum without chitinous lines.....*Parunguis* Chamberlin
17 (14). Anal legs five-jointed beyond coxae, without claws *Nannopodellus* Chamberlin
18 (13). Ventral pores present.....19
19 (21). Labrum without true teeth, the margin simply wavy or crenate 20
20 (21). Anal legs armed with claws; first maxillae without lappets.....*Cymochilus*, gen. nov.
21 (20). Anal legs clawless; first maxillae with lappets *Litoschendyla* Chamberlin
22 (19). Labrum with true teeth.....23
23 (24). Claw of palpi of second maxillae abortive *Schendylellus* Chamberlin
24 (23). Claw of palpi of second maxillae normally developed.25
25 (30). Anal legs clawless.....26
26 (27). Claw of palpus of second maxillae smooth *Schendyla* Berg. and Meinert.
27 (26). Claw of palpi of second maxillae pectinate.....28
28 (29). Coxal glands heterogeneous...*Pectiniunguis* Bollman
29 (28). Coxal glands homogeneous....*Schendylurus* Silvestri
30 (25). Anal legs with claws.....*Nyctunguis* Chamberlin

Cymochilus panamicola, new species

Pale-yellow throughout. Head longer than wide, narrowed from behind middle forward; frontal suture not evident. Prebasal plate not exposed.

Fig. 1. Labrum of *Cymochilus panamicola* n. sp.

Labrum excised, the margin forming a right angle at middle, the crenatures about ten in number, these being apically less

rounded, more acute, as shown in the figure. (Fig. 1.) Mandible with 5 long well sclerotized teeth which seem to be indistinctly separated into two blocks of 2 and 3 teeth respectively. First maxillae without lappets; palpi proportionately thick, biarticulate, the distal article rounded, bearing two setae. Claw of second maxillae well developed, pectinate, the article bearing the claw also with 5 or 6 setae on or toward its distal end.

Orphnaeus brevilabiatus (Newport)

One specimen was taken on Colorado Island on August 13, one at Cocoli on August 21, and one at Summit in October, 1946.

Mecistocephalus maxillaris (Gervais)

One specimen of this tropicopolitan species was taken on November 2, 1946, at Summit.

Notes on a few Scarabaeidae (Coleoptera)

By MARK ROBINSON, Springfield, Pennsylvania

Aphodius manitobensis Brown

1928. *Aphodius manitobensis* Brown, Can. Ent., LX, p. 302.

This species was described from a unique male specimen collected in Manitoba. Recently I collected both sexes in deer droppings in the Pocono Mountains of Pennsylvania. The female specimens differ from the male in having the anterior tibial spur thinner and not so strongly curved caudad. In addition the short spur of the middle tibiae in the female is about half as long as the long spur and it is acute at the apex.

Aphodius guttatus Eschscholtz

1823. *Aphodius guttatus* Eschscholtz, Mem. Soc. Imp. Nat. Moscou., VI, p. 97.

This species was described from Alaska and has been recorded from Labrador. In September 1946 this writer took a specimen near Pittsford, Vermont, in porcupine droppings.

This appears to be the first record of this species being collected in the United States.

Aphodius bicolor Say

1823. *Aphodius bicolor* Say, Journ. Acad. Nat. Sci., III, p. 212.
1938. *Aphodius comanchi* Robinson, Trans. Amer. Ent. Soc., LXIV, p. 146.

Aphodius comanchi is a large light-colored example of *A. bicolor* and the name should be suppressed in favor of the older species. The western forms of this species seem to be larger in size than the eastern forms but I believe they do not merit a distinctive name.

Ataenius insculptus Horn

1887. *Ataenius insculptus* Horn, Trans. Amer. Ent. Soc., XIV, p. 70.

Horn in his description of this species states that it lacks an accessory spinule at the inner angle of the apex of the hind tibiae. The type of this species was examined by the author and a coating of dirt cleaned off the hind tibiae thus revealing a short accessory spinule to be present. This species was described from Florida and has always remained rare in collections, but on May 11, 1947, 23 specimens were collected by the author at Martha, N. J., in deer droppings. These specimens average a little smaller in size but otherwise agree with typical specimens.

Ataenius wenzeli Horn

1887. *Ataenius wenzeli* Horn, Trans. Amer. Ent. Soc., XIV, p. 77.

As in the preceding species, a close examination of the type reveals a short accessory spinule at the apex of the hind tibiae although Horn states that the hind tibiae are without this spinule. The presence of this spinule places this species in the *strigatus* group of *Ataenius*. Mr. Robert Peters collected a small series of this species at Charleston, S. C., in May, 1944, and these specimens have the elytral intervals slightly raised instead of flat as in typical specimens; this condition makes *wenzeli* rather

close to Fall's *rudellus*. Further study and a larger series of specimens may make it necessary to unite these species.

Phyllophaga georgiana Schaeffer

1909. *Phyllophaga georgiana* Schaeffer, Bull. Brook. Ins., I, p. 382.
1938. *Phyllophaga duvalus* Robinson, Trans. Amer. Ent. Soc., LXIV, p. 110.

Since *duvalus* was described the type of *georgiana* has been located in the author's collection. Schaeffer placed his species in Horn's group IV while I placed *duvalus* in group IX where I still think it belongs because the short, fixed spur of the hind tibiae is three-fifths as long as the long spur. The genitalia are missing in Schaeffer's type but on the basis of external characters I believe the two forms to be the same species.

Concerning Drosophila mallochi Frota-Pessoa

By O. Frota-Pessoa

In the June, 1946 issue of Entomological News, I published a note, under the title "*Drosophila mallochi* nom. nov." proposing *D. mallochi* as a new name for *D. lativittata* Malloch 1924 in Malloch & McAtee 1924 Proc. Biol. Soc. Wash. 57: 36–37 (nec *D. lativittata* Malloch 1923 Proc. Linn. Soc. N. S. W. 48: 618).

However, Dr. G. B. Mainland and Dr. G. Steyskal have called my attention to the note on page 64 of W. P. Spencer's paper (1942 Univ. Texas Pub. 4213: 52–66), in which he declares that *D. palustris* is a substitutive name for *D. lativittata*. In spite of this Spencer describes it as a new species and even declares that he sent paratypes to the Museum. The Zool. Record also refers to *D. palustris* as a new species. These facts induced a wrong interpretation.

So, *D. mallochi* remains as a synonym of *D. palustris* Spencer 1942.

Notes and News in Entomology

Under this heading we present, from time to time, notes, news, and comments. Contributions from readers are earnestly solicited and will be acknowledged when used.

More about Dancing Bees.—That honey-bees not only inform their hive-mates of the existence of new sources of nectar but also tell them quite exactly in which direction and at what distance to search are the startling new discoveries of Professor Karl von Frisch. These findings are so remarkable and deal with abilities so far beyond anything previously suspected of any insects that the NEWS is anxious to help make the facts more widely known.

In his first publication [1] on the "language" of bees, as well as in later reports,[2] von Frisch described a "Rundtanz," or circling dance (a running around in small circles with frequent reversal of direction), performed on the combs by any bee returning full of food to the hive. This dance excites nearby individuals and arouses them to rush forth from the hive and, it was said, to search at random for the same food, guided only by the odor that they had perceived upon the dancing bee. For pollen gatherers, another sort of dance was described, the "Schwänzeltanz" or wagging dance.

A new series of experiments [3] continued through 1944 and 1945 brought to light astounding facts, facts so strange, so fantastical, that von Frisch himself could accept them only after oft repeated experiments under varied conditions. In the first place, he found that the differences between the two styles of dance depends only upon the distance from the hive to the food source and not upon whether the food is nectar or pollen. His earlier observations were correct but he erred in his conclusions

[1] K. v. FRISCH, 1923, Über die "Sprache" der Bienen. Zool. Jahrb., Abt. allg. Zool. u. Physiol. 40: 1–186.

[2] For additional references to the literature see article "On Directing the Flight of Bees," by R. G. SCHMIEDER in ENTOMOLOGICAL NEWS 57: 16–19, January 1946.

[3] K. v. FRISCH, 1946, Die Tänze der Bienen. Österreichische Zool. Zeitschr. 1: 1–48.

because he had not varied his experimental conditions sufficiently; he had always placed the food near the hive while the pollen sources were always at a distance.

Bees returning from a distance of 50 meters or less perform the circling dance (Rundtanz); those from 100 meters or more, the wagging dance (Schwänzeltanz). At distances between 50 and 100 meters, there is a gradual change or rather the bee may make both sorts of movements. In the Schwänzeltanz, the bee runs in a semi-circle on one side, say in a clockwise direction, then runs a few steps straight back to where it started, then immediately makes another semi-circle on the other side, i.e., running in a counter-clockwise direction, and again straight back to the starting point. It is during the straight part of the run that the characteristic "Schwänzeln," i.e., the shaking or wagging of the abdomen, occurs.

At distances greater than 100 meters, the number of wagging runs (Schwänzelaufe) per unit of time decreases with the distance. At the same time the number of wagging motions increases so that the vigor of the dance appears as great as before, in fact it gains in emphasis. Thus it is possible by timing the number of runs per unit of time, say 15 seconds, to know with fair accuracy the distance from which the dancing bee has obtained her food.

Even more startling was the second discovery, that the wagging dance also indicates the direction from the hive in which lies the food. It is the straight part of the dance run that indicates with astonishing accuracy the direction as related to the direction of the sun at the particular time of day. If the runs are vertically upward on the comb, the food lies exactly in the direction towards the sun, if downward, opposite the sun. If the run deviates 10° to the right of the vertical, the direction of the food is at that same angle to the right of the sun. A deviation to the left, at whatever angle, would indicate that the food is to be found at the corresponding angle to the left of the sun. Sometimes a dancing bee may move to the opposite face of the comb but the dance will not change, a run to the bee's right still means the food is to the right of the sun, and the same

applies if the entire hive is turned about. On the other hand, if the hive is laid on its side, the runs are then oriented directly towards the food supply and the bee will continue to run towards that same direction, in space, even though the hive be rotated horizontally.

Finally, experiments were devised that demonstrated beyond question that a dancing bee's hive-mates really act on the information received and do search diligently in the direction and at the distance suggested.

Altogether, this paper of von Frisch, like his earlier works, is a perfect example of good scientific writing; it is carefully organized, crystal clear and very readable. In it he allows us to accompany him, so to speak, along his path of discovery. He traces for us his ideas and early experiments that proposed the problems. Then, for each part of the work, he outlines the inductive reasoning that reveals the new hypothesis, and the deductive thinking that suggests to him all the possible conditions that must obtain if his hypothesis be true, and, finally, how he devised and carried out the crucial experiments.—R. G. SCHMIEDER.

The Distribution by States of United States Insect Collection Records. Any one who has studied the distribution of North American insects knows that there are extensive lacunae in the data, even as regards the United States. In order to determine the extent and location of these "blind spots," the writer compiled the number of State records cited in 108 synoptic or revisional papers wherein the distribution of the various species was given in sufficient detail. All too frequently the distribution of a species is cited as "east of the Rocky Mountains" or "Connecticut to Illinois and southward." Such citations mean very little. The 108 papers were all published during the present century and are divided among the various orders as follows: Coleoptera, 23; Diptera, 16; Hemiptera Heteroptera, 6; Hemiptera Homoptera, 9; Hymenoptera, 27; Lepidoptera, 7; Orthoptera, 6; miscellaneous (ten orders), 14.

The number of species cited for each State may be tabulated as follows:

N. Y. 1222	Md. 538	La. 266
Texas 1152	Ore. 530	Nebr. 265
Colo. 1092	Utah 521	Ala. 241
Calif. 1060	Ga. 489	S. D. 236
Ariz. 1036	Ohio 474	S. C. 222
Fla. 801	D. C. 466	Tenn. 196
Pa. 753	N. H. 428	Miss. 185
Ill. 744	Maine 423	Ky. 170
Mass. 744	Iowa 371	Okla. 163
N. J. 712	Idaho 365	W. Va. 133
N. M. 677	Mo. 330	Ark. 130
N. C. 654	Mont. 324	Vt. 125
Va. 636	Conn. 320	R. I. 121
Kans. 624	Wis. 296	N. D. 118
Wash. 558	Minn. 289	Del. 45
Mich. 555	Nev. 284	
Ind. 551	Wyom. 282	

As number of species per thousand square miles, the above data may be expressed as follows:

D. C. 6657	Ohio 12	Tenn. 5
R. I. 97	Colo. 10.5	Wis. 5
Mass. 90	Mich. 10	Idaho 4
N. J. 87	Ariz. 9	Ky. 4
Conn. 64	Ga. 8	Miss. 4
N. H. 46	Kans. 8	Tex. 4
Md. 44	Wash. 8	Minn. 3
N. Y. 25	Calif. 7	Nebr. 3
Del. 19	Iowa 7	Nev. 3
Pa. 17	S. C. 7	S. D. 3
Ind. 15	Utah 6	Wyom. 3
Va. 15	La. 5.5	Ark. 2
Fla. 14	N. M. 5.5	Mont. 2
Ill. 13	Ore. 5.5	N. D. 2
Maine 13	W. Va. 5.5	Okla. 2
Vt. 13	Ala. 5	
N. C. 12.5	Mo. 5	

Among the last half (24) in both the above tables are the following twenty States: Iowa, S. C., La., W. Va., Ala., Mo., Tenn., Wis., Ida., Ky., Miss., Minn., Nebr., Nev., S. D., Wyom., Ark., Mont., N. D., and Okla.

Only three States, N. Y., N. J., and N. C., have comprehensive published State lists which offset the above figures. Some have published lists of several orders or large families; among these are Ohio, Conn., Ill., Kans., Colo., and Iowa.

It was especially difficult to find papers on Lepidoptera in which detailed distributional data is given. There are, however, many State lists of butterflies.

No significant variation was seen between the various orders. It is believed, therefore, that the figures reflect to a large extent the relative amount of collecting that has been done in each State.

If the data be plotted on a map it will be seen that a broad band of nearly "virgin territory" exists from West Virginia through Kentucky, Tennessee, Mississippi, and Arkansas, to Oklahoma, all of which are areas of rich faunal content. A little collecting in these States would yield data of much zoogeographical significance.

Another and more extensive pallid area on the map would extend inclusively from Wisconsin to Idaho and take in Nevada, Montana, Wyoming, both Dakotas, Nebraska, Minnesota, Iowa, and Missouri. In the extreme east Delaware has hardly been touched and among the New England States Vermont has remained aloof.

It is hoped that the data here presented will influence to some degree the choice of collecting sites. However, the insect fauna of even the best-collected States is far from thoroughly known and activity there should not be lessened.—GEORGE C. STEYSKAL.

From Peru comes a request for information to be used in compiling a "Gazetteer of Entomological (or Zoological) Stations in Peru." The names of collectors who visited Peru are wanted and information on their routes, data and experiences regarding their localities that may be of use to subsequent collectors, and references to any published records of their trips and collections. Address: JAROSLAV SOUKUP, Box 999, Lima, Peru.

List of Titles of Publications Referred to by Numbers in Entomological Literature in Entomological News.

1. American Midland Naturalist. Notre Dame, Indiana.
2. American Museum Novitates. New York, N. Y.
3. American Naturalist. Garrison-on-Hudson, New York.
4. Annals of Applied Biology. London.
5. Annals of the Entomological Society of America. Columbus, Ohio.
6. Annals and Magazine of Natural History. London.
7. Annales Academia Brasileira Sciencias. Rio de Janeiro.
8. Anales del Instituto de Biologia Mexico. Mexico City.
9. Anatomical Record. Philadelphia.
10. Arkiv för Zoologie. K. Svenska Vetenkapsakademien i. Stockholm.
11. Arquivos de Higiene e Saude Publica. São Paulo.
12. Biological Bulletin. Woods Hole, Massachusetts.
13. Bios, Rivista Biol. Geneva.
14. Boletin de Entomologia Venezolana. Caracas.
15. Boletin del Museo de Historia Natural "Javier Prado." Lima, Peru.
16. Boletin do Museu Nacional do Rio de Janeiro. Brasil.
17. Bull. Acad. Sci. (Izvestia Akad. nauk) U R S S (S. biol.).
18. Bulletin of the Brooklyn Entomological Society. New York.
19. Bulletin of Entomological Research. London.
20. Bulletin of the Museum of Comparative Zoology. Cambridge, Mass.
21. Bulletin of the Southern California Acad. of Sciences. Los Angeles.
22. C. r. Acad. Sci. (Doklady Akad. nauk) U R S S. Leningrad.
23. Canadian Entomologist. Guelph, Canada.
24. Canadian Journal of Research. Ottawa, Canada.
25. Ecological Monographs. Durham, North Carolina.
26. Ecology. Brooklyn, New York.
27. Entomologica Americana. Brooklyn Ent. Society, New York.
28. Entomological Monthly Magazine. London.
29. Entomological Record and Journal of Variations. London.
30. The Entomologist. London.
31. Florida Entomologist. Gainesville, Florida.
32. Frontiers. Philadelphia, Pennsylvania.
33. Great Basin Naturalist. Provo, Utah.
34. Iowa State College Journal of Science. Ames, Iowa.
35. Journal of Agricultural Research. Washington, D. C.
36. Journal of Animal Ecology. London.
37. Journal of Economic Entomology. Geneva, New York.
38. Journal of the Elisha Mitchell Science Society. Chapel Hill, N. C.
39. Journal of Entomology and Zoology. Claremont, California.
40. Journal of Experimental Biology. London.
41. Journal of Experimental Zoology. Philadelphia, Pennsylvania.
42. Journal of Heredity. Baltimore, Maryland.
43. Journal of the Kansas Entomological Society. Lawrence, Kansas.
44. Journal of Morphology. Philadelphia, Pennsylvania.
45. Journal of the New York Entomological Society. New York.
46. Journal of Parasitology. New York.
47. Journal of the Tennessee Academy of Sciences. Nashville, Tenn.
48. Journal of the Washington Academy of Sciences. Washington, D. C.
49. Memorias do Instituto Oswaldo Cruz. Rio de Janeiro.
50. Microentomology. Stanford University, California.
51. The Microscope and Entomological Monthly. London.
52. Mosquito News. Albany, New York.
53. Nature. London.
54. Nature. Washington, D. C.
55. La Naturaliste Canadien. Quebec.

56. Natural History. New York.
57. Occasional Papers, Mus. of Zool., Univ. of Michigan. Ann Arbor.
58. Ohio Journal of Science. Columbus, Ohio.
59. Opinions and Declarations. Intern. Com. Zool. Nomencl. London.
60. Pan-Pacific Entomologist. San Francisco, California.
61. Parasitology. London.
62. Proceedings of the Academy of Natural Sciences. Philadelphia.
63. Proceedings of the Biological Society of Washington. Washington, D. C.
64. Proceedings of the California Academy of Sciences. San Francisco.
65. Proceedings of the Entom. Soc. of Washington. Washington, D. C.
66. Proceedings of the Hawaiian Entomological Society. Honolulu.
67. Proceedings of the National Acad. of Sciences. Washington, D. C.
68. Proceedings of the Royal Entomological Society of London. Ser. A.
69. Proceedings of the Royal Entomological Society of London. Ser. B.
70. Proceedings of the Royal Entomological Society of London. Ser. C.
71. Proceedings of the U. S. National Museum. Washington, D. C.
72. Proceedings of the Zoological Society of London. London.
73. Psyche, A Journal of Entomology. Boston, Massachusetts.
74. Quarterly Journal of Microscopical Science. London.
75. Quarterly Review of Biology. Baltimore, Maryland.
76. Revista Academia Columbiana de Cien. Exact. Fis. y Nat. Bogotá.
77. Revista Chilena de Historia Natural. Valparaiso, Chile.
78. Revista Instituto Salubridad y Enfermedades Tropicales. Mexico.
79. Revista Sociedad Mexicana de Historia Natural. Mexico City.
80. Science. Washington, D. C.
81. Scientific Monthly. New York.
82. Smithsonian Miscellaneous Collections. Washington, D. C.
83. Transactions of the American Entomological Society. Philadelphia.
84. Transactions of the Amer. Microsc. Soc. Menasha, Wisconsin.
85. Transactions of the Illinois State Academy of Sciences. Springfield.
86. Transactions of the Kansas Acad. of Sci. Manhattan, Kansas.
87. Transactions of the Royal Canadian Institute. Toronto.
88. Transactions of the Royal Entomological Society. London.
89. U. S. Dept. of Agric., Farmer's Bulletins. Washington, D. C.
90. U. S. Dept. of Agric., Technical Bulletins. Washington, D. C.
91. University of California Publications in Entomology. Berkeley.
92. University of California Publications in Zoology. Berkeley.
93. University of Kansas, Science Bulletins. Lawrence, Kansas.
94. Ward's Natural Science Bulletin. Rochester, New York.
95. Zoologica. New York.
96. American Journal of Public Health. Boston.
97. American Journal of Tropical Medicine. Baltimore.
98. Annals of Tropical Medicine and Parasitology. Liverpool.
99. Canadian Journal of Research. Section E, Medical Sciences, Ottawa.
100. Turtox News. Chicago, Illinois.
101. Mitteilungen der schweitzerischen entomologischen Gesellschaft, Bern.
102. Revue de Entomologie. Rio de Janeiro, Brasil.
103. Proceedings of the Royal Society of London.
104. Anales de la Escuela Nacional de Ciencias Biologicas. Mexico.
105. Journal of Cellular and Comparative Physiology. Philadelphia.
106. Redia. Florence, Italy.
107. Annales de la Société Entomologique de France. Paris.
108. Bulletin de la Société Entomologique de France. Paris.
109. Notulae Naturae. Philadelphia.
110. L'Entomologiste. Paris.
111. Revista Brasiliera de Biologie. Rio de Janeiro.
112. Eos, Revista Española de Entomologia. Madrid.
113. Minist. de Agri. de la Nación, Inst. Sanidad Vegetal, Buenos Aires.

Current Entomological Literature

COMPILED BY EDWIN T. MOUL, RAYMOND Q. BLISS, CHARLES HODGE IV, MAURICE E. PHILLIPS, JOHN W. H. REHN AND HENRY K. TOWNES, JR.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of periodicals and serials published in our January and June issues. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—Blackwelder, R. E.—The dates and editions of Curtis' British Entomology. [82] 107: 1–27, ill. **Carpenter, F. M.**—Early insect life. [73] 54: 65–85, ill. **Curtis, W. P.**—Nomenclature again. [28] 83: 100–102. **Fullaway, D. T.**—Niihau insects. [66] 13: 51–53. **Haydak, M. H.**—Rearing clothes moth and black carpet beetle in the laboratory. [37] 40: 279–80. **Maimardi, A.**—Proposta di un modo di preparare gli insetti minuti, e descrizione di un apparacchietto per poterli studiare comodamenta al microsopio. [Riv. di Parassit.] 7: 113–18 (1943). **Osborn, H.**—On the status of grass insects. [65] 49: 149–50. **Sabrosky, C. W.**—Stability of family names: some principles and problems. [3] 81: 153–60. **Setterstrom, C. A.**—Banishing bug bites. [52] 6: 186–88. **Smith, Dean and Kelly**—The sixteenth or 1946 annual population summary of Kansas insects. [43] 20: 41–58. **Smith, H. S.**—Biological control of weeds in the U. S. [65] 49: 169–70. **Steedman, H. F.**—Ester wax: a new embedding medium. [74] 88: 123–33. **Woods, R. S.**—Addenda to the naturalist's lexicon. Abhey Garden Press, Pasadena, Cal.

ANATOMY, PHYSIOLOGY, MEDICAL—Callot, J.—Nouveaux cas de phorésie. [Annales de Parasit.] 23: 379–80, ill. (1946). **Calvert, P. P.**—How many mosquito larvae and pupae are required to make one dragonfly (Aeschnidae)? [65] 49: 171–72. **Ciaccio, G.**—Ricerche sull'accrescimento e sullo sviluppo delle ghiandole salivari delle larve li Anopheles maculipennis. [Riv. di Parassit.] 5: 217–34

(1941). **Corradetti, A.**—Sull'introduzione di metodi genetici per la determinazione delle specie negli anofelini. [Riv. di Parassit.] *7*: 43–48 (1943). **Dean and Chapman**—Biology and control of the apple redbug. [N. Y. State Agr. Exp. Station] Bull. *716*: 3–42. **Judd, W. W.**—The proventriculus of the larva of the caddis-fly, Macronema zebratum (Trichoptera: Hydropsychidae). [24] 25: 87–90, ill. **Nucciotti, L.**—Sulla resistenza all'immersione subacquea delle larva di Anopheles gambiae. [Riv. di Parassit.] *7*: 87–90 (1943). **Oliveira e Moussatché**—Açãu do DDT sobre larvas e pupas de Musca domestica. [111] *7*: 67–72, ill. **Salt, R. W.**—Some effects of temperature on the production and elimination of diapause in the wheat stem sawfly Cephus cinctus. [24] 25: 66–86. **Stammers and Whitefield**—The toxicity of DDT to man and animals. [19] 38: 1–73. **Thornton, D.**—The effect of 2,4-dinitrophenol on the larval growth of Drosophila melanogaster. [Growth] 11: 51–60. **Travis, B. V.**—Relative efficiency of six species of mosquitoes from Guam, M. I., as developmental hosts for Dirofilaria immitis. [46] 33: 142–45. **Vanni, V.**—Sulla biologica e morfologia di Phlebotomus perniciosus nella provincia di Napoli. [Riv. di Parassit.] *7*: 121–26 (1943). **Villee, C. A.**—A spectrophotometric analysis of the eye colors of Habrobrucon. [Genetics, N. Y.] 32: 277–85. **Whittinghill, M.**—A doubly mosaic Drosophila of unusual type. [38] 63: 37–42.

ARACHNIDA AND MYRIOPODA—André et Ansel—Sur la présence d'un Oribatid (Notaspis coleoptratus) dans le tissu sous-cutané d'un triton marbré Triturus marmoratus. [Annales de Parasit.] 21: 376–77 (1946). **Banks, N.**—On some Acarina from North Carolina. [73] 54: 110–41, ill. (k*). **Bryant, E. B.**—A list of spiders from Mona Island, with descriptions of new and little known species. [73] 54: 86–99, ill. (*). **Delpy, L.-P.**—Revision, par des voies expérimentales, du genre Hyalomma C. L., Koch 1884 (Ixodidae). Note préliminaire. 1. Nécessite d'une révision du genre Hyalomma. [Annales de Parasit.] 21: 267–93, ill. (1946). **Grant, C. D.**—American mites of the genus Laelaps (Acarina). [50] 12: 1–21, ill. (k*); Redescription of a snake-infesting mite. [50] 12: 22–23, ill. **Pavlov, P.**—Richerche sperimentali sulla tassina delle uova di Ixodinae. [Riv. di Parassit.] 6: 101–06 (1942). **Schubart, O.**—Um novo representante da familia Leptodesmidae, Macrocoxodesmus marcusi, n. g., n. sp. (Diplopoda). [111] *7*: 109–12, ill.

SMALLER ORDERS—Augustson, G. F.—Xenopsylla fleas of the Hawaiian Islands (Pulicid). [66] 13: 33–36, ill. **Bianchi, F. A.**—Thysanoptera Hawaiiensis, I. [66] 13: 37–42, ill. (*). **Brues, C. T.**—Predatory enemies of winged termites. [65] 49: 167–68. **Calvert, P. P.**—(See under Anatomy.) **Carpenter, F. M.**—Taxonomic notes on the Dilaridae (Neuroptera). [73] 54: 100–09, ill. (*). **Filho e de Castro**—Spongiphora moreirae, nome novo para Spongiphora dissimilis Moreira, 1930, com redescrição do macho (Labiidae, Dermaptera). [111] *7*: 1–3, ill. **Hopkins, G. H. E.**—Notes on mallophagan nomenclature, II. [30] 80: 73–79. **Hubbard, C. A.**—Fleas of western N. Amer. [Iowa State Coll. Press, Ames], ill., 533 pp. **Judd, W. W.**—(See under Anatomy) (Trichoptera). **Sakimura, K.**—Thrips in relation to gall-forming and plant disease transmission: a review. [66] 13: 59–95. **Westfall, M. J., Jr.**—A new Macromia from North Carolina. [38] 63: 32–36, ill. (k*).

ORTHOPTERA—Chopard, L.—Orthopteroides de L'Afrique du Nord. [Faune de L'Empire Français, La-Rose, Paris] 1: 1–447, ill. (k*). **Rehn, J. A. G.**—The removal of the mantid genus Callimantis from the N. Amer. fauna. [65] 49: 163–64.

HEMIPTERA—Beamer, R. H.—Some new species of Delphacodes with two old ones (Fulgoridae). [43] 20: 58–71, ill. (*). **Dean and Chapman**—(See under Anatomy.) **Ferris, G. F.**—Information concerning the genera Chortinaspis and Aspidiotus (Diaspididae). [50] 11: 37–49, ill. (k*). **Lent e Wygodzinsky.**—Sôbre algumas espécies de Zelurus Hahn (Reduviid). [111] *7*: 25–55, ill. **McKenzie, H. L.**—Supplementary notes on the genera Aonidiella and Parlatoria (Diaspididae). [50] 11: 29–36, ill. (k*). **Steinweden, J. B.**—The identity of certain common American species of Pulvinaria (Coccidae). [50] 11: 1–28, ill. (k*). **Usinger, R. L.**—Notes on Graptostethus in Hawaii (Lygaeidae). [66] 13: 107–08. **Wygodzinsky, P.**—Novas contribuições ao conhecimentos dos Stenolemus das Américas (Emesinae, Reduviid). [111] *7*: 127–44, ill. (k*).

LEPIDOPTERA—Clarke, A. H.—The interrelationships of the several groups within the butterfly superfamily Nymphaloidea. [65] 49: 148–49. **Evans, W. H.**—Hesperiana. [65] 49: 162–63. **Needham, J. G.**—A moth larva that lives on fern spores (Heliodinid). [65] 49: 165–66. **Swezey, O. H.**—Elaphria nucicolora, a recent immigrant

to Hawaii (Agrotidae). [66] 13: 99–100; Two new Hawaiian moths on Chenopodium oahuense. [66] 13: 103–04.

DIPTERA—Abbott, C. E.—The eggs of mosquitoes. [100] 25: 98–99. **Bonnet, D. D.**—The distribution of mosquito breeding by type of container in Honolulu. [66] 13: 43–49. **Buren, W. F.**—Psorophora pygmaea, an exotic mosquito now established in Florida. [52] 6: 185. **Callot, J.**—(See under Anatomy.) **Ciaccio, G.**—(See under Anatomy.) **Coradetti, A.**—(See under Anatomy.) **Corradetti e Lupascu**—Studi sull'ipopigio maschile dei Nycteribiidae. [Riv. di Parassit.] 5: 85–100 (1941). **Freire e Faria**—Criação e alguns dados sôbre a biologia do Anopheles (N.) darlingi. [111] 7: 57–66. **Hardy, D. E.**—The genus Leptopteromyia (Asilidae). [43] 20: 72–75, ill. (*). **Nucciotti, L.**—(See under Anatomy.) **Pavan, M.**—Appunti sui Nycteribiidae. [Riv. di Parass.] 5: 100–108 (1941). **Pritchard, Seabrook and Provost**—The possible endemicity of Anopheles albimanus in Florida. [52] 6: 183–84. **Sabrosky, C. W.**—A new species of the dipterous family Asteiidae from Hawaii. [66] 13: 55–57. **Sacca, G.**—Introduzione allo studio biologico e sistematico del genere Phlebotomus. [Riv. di Parassit.] 5: 53–66 (1941). **Seabrook & Duffey**—The occurrence of megarhinus rutilus in S.E. Florida. [52] 6: 193–94. **Stefanelli, A.**—Affinità sistematiche dei chirotteri e parassitismo dei Nycteribiidae. Parte I. Gli ospiti. [Riv. di Parassit.] 6: 25–42 (1942). **Stone, A.**—A new Procecidochares from Eupatorium stems (Tephritidae). [66] 13: 97–98, ill. **Thornton, D.**—(See under Anatomy.) **Travis, B. V.**—(See under Anatomy.) **Thompson, G. A.**—Occurrence of Anopheles atropos in Jamaica. [52] 6: 193. **Trembley, H. L.**—Biological characteristics of laboratory reared Aedes atropalpus. [37] 40: 244–50. **Vanni, V.**—(See under Anatomy.) **Walton, W. R.**—Local tabanid unrecovered after 28 years. [65] 49: 168. **Whittinghill, M.**—(See under Anatomy.) **Wirth, W. W.**—Notes on the genus Thalassomyia, Shiner, with descriptions of two new species (Tendipedidae). [66] 13: 117–39, ill. (k); Ephydra gracilis, a recent immigrant fly in Hawaii (Ephydrid). [66] 13: 141–42. **Wirth, W. W.**—A review of the genus Telmatogeton Schiner, with descriptions of 3 new Hawaiian species (Tendipedidae). [66] 13: 143–91, ill. (k).

COLEOPTERA.—Barber, H. S.—Diabrotica and two new genera (Chrysomel.). [65] 49: 151–61, ill. (k). Fisher, W. S.—New Cerambycid beetles belonging to the tribe Rhinotragini. [71] 97 (3209): 45–57. **Fletcher, F. C.**—The odd beetle. [94] 20: 68–78. **Jeannel, R.**—Coleopteres carabiques de la region Malgache. [Faune de L'Empire Français, LaRose, Paris] 6: 1–372, ill. (k*). **Paulian, R.**—Coleopteres scarabeides de l'Indochine. [Faune de L'Empire Français, LaRose, Paris—1945] 3: 1–225, ill. (k*). **Swezey, O. H.**—A new Neoclytarlus from Chenopodium oahuense (Cerambycidae). [66] 13: 101–02. **Van Zwaluwenburg, R. H.**—Some elaterid beetles from Australia and New Guinea. [66] 13: 109–16, ill. (*). **Villiers, A.**—Coleopteres Cerambycides de L'Afrique du Nord (Faune de L'Empire Français, LaRose, Paris—1946] 5: 1–52 (k). **Zimmermann, E. C.**—A new Phanerostethus from the New Hebrides (Curculionidae). [66] 13: 193–95, ill.

HYMENOPTERA—Bailey, N. S.—Trichopria tabaniuora in Massachusetts (Diapriidae). [73] 54: 142. **Goodland, W. S. L.**—Ants carrying dead. [28] 83: 103–04, ill. **Krombein, K. V.**—An unnoticed subgeneric name in Bombus. [65] 49: 170. **Pate, V. S. L.**—The Pemphilidine wasps of the Caribbees. [83] 73: 1–33, ill. (k*). **Salt, R. W.**—(See under Anatomy.) **Simmonds, F. J.**—The biology of the parasite of Loxostege sticticalis in N. Amer., Bracon vulgaris. [19] 38: 145–55, ill. **Townes, H.**—A Eumenes wasp and six adventive Ichneumonidae new to Hawaii. [66] 13: 105–06. **Villee, C. A.**—(See under Anatomy.)

SPECIAL—Hemming, F., ed.—Opinion 16. The status, under rule (d) in article 30, of a pre-binomial specific name, published prior to 1758, in relation to a generic name published on, or before, 31st December 1930. [59] 1: Part 25: 255–304, 1947. **Hemming, F., ed.**—Opinion 181: On the type of the genus Carcharodus Hübner [1819], and its synonym Spilothyrus Duponchel, 1835 (Class insecta, Order Lepidoptera), genera based upon an erroneously determined species. [59] 2: Part 51; 589–612, 1947.

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LEPIDOPTERA

1125.—Jones (F. M.)—Platoeceticus Packard, and a remarkable n. sp. of the genus (Psychidae) (71: 99–124, 4 pls., 1945) .... .75